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10/594,031	09/25/2006	Kenji Shiga	12477/13	4637

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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,031	SHIGA ET AL.	
	Examiner	Art Unit	
	ROBERT JONES JR.	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-38* is/are rejected.

7)☒ Claim(s) *23 and 35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1 March 2010 has been entered.

Claim Interpretation

2. Independent Claims 7, 17, 25, and 38 require “a portion” of two or more glycidyl groups and/or isocyanate groups of reactive compound (II) to be reacted with amorphous polyester (I). Neither the claims nor the instant specification define what amount of glycidyl and/or isocyanate functional groups must be reacted to satisfy the requirement for "a portion". Without any further guidance from the specification, the phrase "a portion" will be interpreted as meaning any amount of glycidyl and/or isocyanate functional group greater than 0%.

3. Furthermore, the Applicant’s arguments (see p. 9) indicate that Example 1 of the instant specification illustrates the conditions under which a portion of the functional groups will react with the amorphous polyester resin. Example 1

illustrates mixing and melting of an amorphous polyester resin and a reactive compound with a minor amount of additives, followed by kneading with an extruder. Any reaction which conforms to the general guidelines demonstrated by Example 1 will be deemed to satisfy the requirement for reacting "a portion" of two or more glycidyl and/or isocyanate groups of reactive compound (II) with amorphous polyester (I)

Claim Objections

4. Claims 23 and 35 are objected to because of the following informalities: Both claims contain the term "polybutyrene". This is believed to be a typographical error, and should be corrected to read --polybutylene--. Appropriate correction is required.

Claim Rejections – 35 USC § 102/103

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 17-21 and 23-29 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious

over Shiga et al. (US PG Pub. No. 2004/0010073; US Patent No. 7,084,214, cited in previous Office Action, is referred to herein as an equivalent document).

10. Regarding Claims 17 and 21, Shiga teaches a polyester resin composition comprising an amorphous polyester, at least one component selected from the group consisting of a crystalline polyester and a nucleating agent, and optionally a reactive compound (col. 3, lines 29-35). Preferably, the reactive compound has at least two functional groups per molecule (col. 8, lines 4-6). Preferred functional groups of the reactive compound are isocyanate groups and glycidyl groups (col. 8, lines 23-24). The weight average molecular weight of the reactive compound is preferably from 200 to 500,000 (col. 8, lines 36-41). The reactive compound and polyester form a partially crosslinked product when the reactive compound reacts with the hydroxyl group and carboxyl group of the polyester to form a reaction product in the melt extrusion process (col. 8, lines 7-12). This is indicative that some portion of the glycidyl and/or isocyanate groups of the reactive compound are reacted with the amorphous polyester. Alternatively, it would have been obvious to one of ordinary skill in the art based on Shiga's commentary on column 8, lines 7-12 that a portion of the functional groups present in the reactive compound are reacted with the amorphous polyester.

11. Regarding Claims 18-20, the amorphous polyester preferably comprises an aromatic carboxylic acid having 8 to 14 carbon atoms and an aliphatic or cycloaliphatic glycol having 2 to 10 carbon atoms as main components (col. 4, lines 10-14). "Main component" is defined such that an amount of an aromatic carboxylic acid having 8 to 14 carbons or an aliphatic or cycloaliphatic glycol

having 2 to 10 carbon atoms is at least 50% by mole (col. 4, lines 14-17). Preferably, the aromatic carboxylic acid is terephthalic acid, isophthalic acid, or their mixture (col. 4, lines 27-28). The glycol component is preferably at least one of ethylene glycol, diethylene glycol, neopentyl glycol, cyclohexanedimethanol, 1,3-propanediol and 2-methyl-1,3-propanediol.

12. Regarding Claim 21, specific examples of the reactive compound include styrene/methyl methacrylate/glycidyl methacrylate copolymers (col. 8, lines 31-32). One example of the reactive compound consists of 36.4 parts styrene, 37.3 parts glycidyl methacrylate, and 26.3 parts methyl methacrylate (col. 17, lines 57-59).

13. Regarding Claims 23 and 35, the crystalline polyester preferably comprises at least 50% by mole of at least one alcohol selected from a group which includes ethylene glycol. The crystalline polyester also comprises a polybasic carboxylic acid such as terephthalic acid (col. 6, lines 7-12). One of ordinary skill in the art would at once envisage the use of PET as the crystalline polyester based on this disclosure.

14. Regarding Claims 24 and 36, the claims require “reproduced” PET. The requirement “reproduced” (i.e. recycled) is a product-by-process limitation. Although Shiga does not disclose reproduced or recycled PET, it is noted that “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product

of the prior art, the claim is unpatentable even though the prior product was made by a different process", *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) . Further, "although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product", *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir.1983). See MPEP 2113. Therefore, absent evidence of criticality regarding the presently claimed process and given that PET meets the requirements of the claimed composition, Shiga clearly meet the requirements of present claims 24 and 36.

15. Regarding Claims 25 and 37, Shiga's Example 14 illustrates a process which involves mixing an amorphous polyester (A), a crystalline polyester (a), and a reactive compound (R). The mixture is then kneaded and profile extrusion molded to form a molded article (col. 18, lines 29-41). Profile extrusion molding reads on the claimed melt molding. This process is similar to the process illustrated by Example 1 of the instant specification. Thus, although not explicitly taught by Shiga, a portion of reactive compound (R) will react with amorphous polyester (A), thereby satisfying all requirements of Claim 25. The resultant molded article reads on Claim 37.

16. Regarding Claims 26-28, amorphous polyester (A) is composed of 50% terephthalic acid, 40% ethylene glycol, and 10% neopentyl glycol (col. 15, Table 1, entry A).

17. Regarding Claim 29, reactive compound (R) consists of 36.4 parts styrene, 37.3 parts glycidyl methacrylate, and 26.3 parts methyl methacrylate (col. 17, lines 57-59).

18. Claim 38 is rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over Akira (JP 2003-238777; cited in previous Office Action).

19. Akira teaches a polyester composition comprising a polyester resin and a reactive compound. The polyester resin is amorphous (p. 3, Claim 4), and comprises an aromatic dicarboxylic acid having 8-14 carbons and aliphatic or alicyclic glycols having 2-10 carbons (p. 3, Claim 5). Akira's reactive compound contains a glycidyl group and/or two or more isocyanate groups per molecule (p. 3, Claim 2). An example of Akira's reactive compound is described as a styrene/methyl methacrylate/glycidyl methacrylate copolymer (p. 10, para. [0036], lines 1-5). Said reactive compound preferably has a molecular weight of 200 to 500,000 (p. 9, [0033]). The composition is prepared by kneading the amorphous polyester and reactive compound, followed by extrusion. See, for instance, Example 1 (p. 14, [0060]), in which 100 parts of polyester and 10 parts of a reactive compound are kneaded in an extruder at a barrel temperature of 180°C. This procedure is substantially similar to the instant Example 1, and will thus inherently result in reacting a portion of the glycidyl groups of the reactive compound with the amorphous polyester. Alternatively, one of ordinary skill in the art would reasonably expect that some portion of the glycidyl groups in the

reactive compound will react with the amorphous polyester when carrying out a procedure similar to that set forth in Akira's Example 1.

20. Akira's composition is not explicitly taught as being a modifier. However, said composition is identical to the claimed modifier, and thus is capable of serving as a modifier. Additionally, the limitation "used in the process according to any one of claims 25 to 36" is a statement of intended use. Said limitation does not require steps to be performed or limit the claims to a particular structure. Therefore, the limitation "used in the process according to any one of claims 25 to 36" does not limit the scope of the instantly claimed modifier, and need not be taught by the prior art in order to anticipate the claims.

Claim Rejections - 35 USC § 103

21. Claims 7-11, 13-15, 25-29, and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Avramova et al. (US Pat. No. 4,915,885; cited in previous Office Action) in view of Akira.

22. Regarding Claims 7 and 25, Avramova teaches a homogenous amorphous polymeric blend of poly(ethylene terephthalate) (PET) and poly(butylene terephthalate) (PBT) (Abstract), said blend comprising a mixture of both polymers in the amorphous state (col. 2, lines 60-67). The PET-PBT blend exhibits a higher tensile strength and elasticity modulus with respect to pure commercial PET and PBT separately, and preserves its amorphous state at room temperature.

23. Avramova further teaches a process of preparing a homogenous amorphous polymeric blend of poly(ethylene terephthalate) (PET) and poly(butylene terephthalate) (PBT) (Abstract, lines 1-3), said blend comprising a mixture of both polymers in the amorphous state (col. 2, lines 60-67). The PET-PBT blend exhibits a higher tensile strength and elasticity modulus with respect to pure commercial PET and PBT separately, and preserves its amorphous state at room temperature. Avramova's process consists of mixing the PET and PBT, melting the mixture, and cooling the mixture (col. 2-3, Claim 1), and may further comprise forming the polymeric blend into a shaped object during the cooling step (col. 3, Claim 3), comparable to melt molding.

24. Avramova does not teach a reactive compound containing two or more glycidyl groups and/or isocyanate groups per one molecule and having a weight average molecular weight of not less than 200 and not more than 500 thousand, and further does not teach said reactive compound comprising 20-99% by weight of vinyl aromatic monomer, 1-80% by weight of hydroxyalkyl (meth) acrylate, and 0-79% by weight of alkyl (meth) acrylate.

25. In the same field of endeavor, Akira teaches a polyester composition comprising a polyester resin and a reactive compound. The polyester resin is amorphous (p. 3, Claim 4), and comprises an aromatic dicarboxylic acid having 8-14 carbons and aliphatic or alicyclic glycols having 2-10 carbons (p. 3, Claim 5). Akira’s reactive compound contains a glycidyl group and/or two or more isocyanate groups per molecule (p. 3, Claim 2). An example of Akira's reactive compound is described as a styrene/methyl methacrylate/glycidyl methacrylate

copolymer (p. 10, para. [0036], lines 1-5). Said reactive compound improves melt strength during extrusion (p. 9, para. [0034], lines 4-7).

26. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Avramova's blend of amorphous PET and PBT, as well as the process of forming said blend, to include Akira's reactive compound for the benefit of improving melt strength during extrusion. One of ordinary skill in the art will recognize that some portion of glycidyl groups in Akira's reactive compound will necessarily react with one or both of Avramova's amorphous polyesters. Thus, modification of Avramova in view of Akira satisfies Claims 7 and 25.

27. Regarding Claims 7-10 and 26-28, PET is an amorphous polyester composed of terephthalic acid and ethylene glycol.

28. Regarding Claims 11 and 29, Akira's reactive compound is further described as comprising 36.4 % styrene by weight, 37.3% glycidyl methacrylate, and 26.3% methyl methacrylate (p. 13, para. [0057], lines 3-4).

29. Regarding Claims 13-14 and 31-32, PBT is an amorphous polyester composed of terephthalic acid and 1,4-butanediol.

Regarding Claims 15 and 33, PBT is composed of terephthalic acid and 1,4-butanediol. Avramova does not teach the diol component required by Claims 15 and 33. However, 1,4-butanediol and 1,3-propanediol are homologs - compounds differing regularly by the successive addition of the same chemical groups, in the present instance, a single methylene group. The courts have held, as found in *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977), that

compounds which are homologs "are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties". In light of the case law, it therefore would have been obvious to one of ordinary skill in the art that the 1,3-propanediol disclosed in the present claims is but an obvious variant of the 1,4-butanediol disclosed in Avramova, and thereby one of ordinary skill in the art would have arrived at the claimed invention.

30. Claims 12, 16, 30, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Avramova in view of Akira as applied to claims 7 and 25 above, further in view of Borman (US Pat. No. 3,953,404; cited in previous Office Action).

31. Regarding Claims 12, 16, 30, and 34, Avramova in view of Akira remains as applied above. Avramova and Akira do not teach that either of the amorphous polyester resins (I) or (III) contain a polyfunctional compound unit having three or more carboxyl groups and/or hydroxyl groups as a monomer component at 0.001 to 5 mole% of an acid component and/or a glycol component, respectively.

32. Borman teaches a branched polyester which contains a branching component having at least three ester-forming groups, said branching component being included from 0.01 to 3 mole percent based on the terephthalate units (col. 2, lines 50-55). Examples of suitable branching components are tri- or tetracarboxylic acids, triols, and tetrols (col. 3, lines 32-36). Branching in the polyester results in increased molecular weight (col. 2, lines 39-42) and higher melt strength (col. 3, lines 40-43).

33. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Avramova in view of Akira to further include Borman's branching component in either of the amorphous polyester resins (I) and/or (III) for the benefit of increased molecular weight and higher melt strength. Including 0.01 to 3 mole percent of said branching agent in either PET or PBT reads on Claims 12, 16, 30, and 34.

34. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shiga as applied to claim 17 above, and further in view of Borman.

35. Regarding Claim 22, Shiga remains as applied above. Shiga does not teach that said amorphous polyester contains polyfunctional compounds having three or more carboxyl and/or hydroxyl groups.

36. Borman teaches a branched polyester which contains a branching component having at least three ester-forming groups, said branching component being included from 0.01 to 3 mole percent based on the terephthalate units (col. 2, lines 50-55). Examples of suitable branching components are tri- or tetracarboxylic acids, triols, and tetrols (col. 3, lines 32-36). Branching in the polyester results in increased molecular weight (col. 2, lines 39-42) and higher melt strength (col. 3, lines 40-43).

37. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Shiga to include Borman's branching component in the amorphous polyester resin for the benefit of increased molecular weight and

higher melt strength. Including 0.01 to 3 mole percent of said branching agent in said amorphous polyester reads on Claim 22.

Response to Arguments

38. The Applicant's arguments regarding the limitation "wherein a portion of said two or more glycidyl groups and/or isocyanate groups of said reactive compound (II) is reacted with said amorphous polyester resin (I)" are convincing. The position set forth in the Advisory Action dated 19 January 2010 indicated that this limitation represented new matter. The Applicant points to page 5, lines 7-11 for support of this limitation. The limitation does not have literal support in this portion of the specification. However, upon further consideration, it is the opinion of the Examiner that this limitation is at least intrinsically supported by the cited paragraph. Thus, the amended claims will not be subject to a new matter-type rejection under 35 USC 112, first paragraph.

39. The Applicant's arguments regarding the previous rejection of Claims 7-38 under 35 USC 112, first paragraph for failing to comply with the enablement requirement are persuasive. As per the Applicant's argument, Examples 1 and 10 are working examples. When read in light of the specification, particularly page 5, lines 7-11, one of ordinary skill in the art would reasonably expect that these examples would lead to the claimed invention. There is no reason to doubt

the accuracy or objective truth of the specification, and therefore, the enablement rejection of Claims 7-38 is withdrawn.

40. The amendment to the claims is sufficient to overcome the previous rejection of Claims 7-38 as being indefinite under 35 USC 112, second paragraph.

41. The new grounds of rejection relies upon references to Shiga, Avramova, Akira, and Borman which were applied in a previous Office Action. The Applicant's remarks dated 16 June 2009 address these references. The arguments hinge upon the assertion that none of the applied references teach partially reacting a reactive compound with an amorphous polyester resin. As per the rejections set forth above, the applied references do not explicitly teach reacting "a portion" of the functional groups of a reactive compound with an amorphous polyester.

42. However, it is the Examiner's position that the required "portion" will either inherently or intrinsically be reacted with the amorphous polyester as set forth in each rejection. The term "portion" is not adequately defined in the specification to place any sort of upper or lower limit on the degree to which the functional groups of the reactive compound react with the amorphous polyester. Thus, any reaction between the two may be construed as reacting "a portion" of said functional groups.

43. Additionally, based on the working examples in the specification, it appears that no additional measures need to be taken to achieve the required partial reaction outside of standard mixing and melt-kneading in an extruder.

This procedure or a close variation thereof is taught in the applied references. Thus, based on the instant specification, there is no reason to doubt that a portion of functional groups in the reactive compound is reacting with the amorphous polyester.

44. Therefore, despite the Applicant's previous arguments, the references to Shiga, Avramova, Akira, and Borman remain applicable.

Conclusion

45. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT JONES JR. whose telephone number is (571)270-7733. The examiner can normally be reached on Monday - Thursday, 9 AM - 5 PM.

46. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

47. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RSJ

/David Wu/
Supervisory Patent Examiner, Art Unit 1796